FLORIDA BAY

SUMMARY

MAP

The South Florida Water Management District, in collaboration with the Everglades National Park and Florida International University, monitors water quality in Florida Bay to track the influences of fresh water inflows to the bay. Salinity and chlorophyll *a* are used as indicators of water quality within Florida Bay.

Salinity

As an estuary, Florida Bay requires a properly maintained salinity regime for the overall ecological health of the bay. Salinity can be defined as the grams of salt dissolved in a kilogram of water and is expressed in units of parts per thousand (ppt). Within the bay, salinity is affected by freshwater input, in the form of rainfall and surface water runoff from the Everglades, and transport of seawater into the bay predominantly from the Gulf of Mexico. Because the bay is a shallow and wide lagoon, evaporation also affects salinity levels. When evaporation exceeds freshwater input, portions of the bay can become hypersaline. Water conditions in the bay are considered hypersaline when salinity exceeds 35 ppt, which is the approximate mean salinity of ocean water. The central portion of the bay contains small basins surrounded by shallow seagrass banks that extend toward the western edge of Florida Bay. Because of the bathymetry of this region, it is especially susceptible to hypersaline conditions.

In **Figure 30**, historical (1991 – 1999) mean and range of salinity values at nine monitoring stations in Florida Bay are compared with their monthly mean salinity values for 2000. Stations selected for this comparison lie along a west to east transect and depict salinity changes with lateral distance from the western boundary of the ENP (*i.e.*, Gulf of Mexico) to the eastern boundaries of Florida Bay.

During the 2000-monitoring year, only two salinity values were greater the historical range. Both values were observed at the East Cape site (**Figure 30**) and occurred during August and September. Salinity values were generally higher than the historic mean along the western and central portions of the transect. In contrast, salinity values were equally distributed about the historic mean for the eastern portion of the transect. Within the eastern portion of the bay, freshwater inflows have a greater affect of the salinity regime than in the central or western portions.

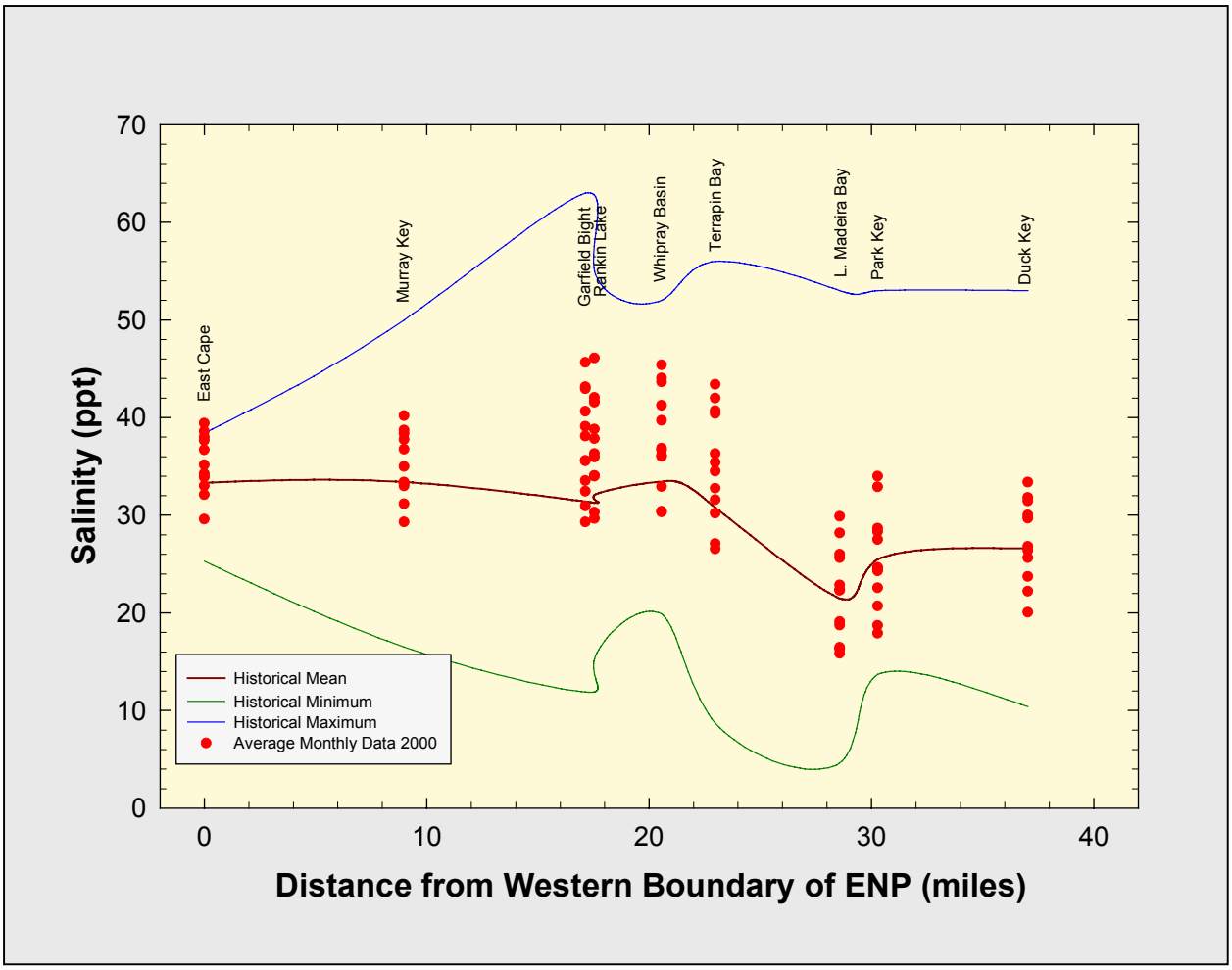

Figure 30. Comparison of historic salinity (1991-1999) with monthly means measured in 2000 at nine monitoring stations in Florida Bay along a west to east transect.

Maps showing salinity contours within Florida Bay from October through December 2000 are depicted in **Figures 31a** through **31c**. Overall, salinity in Florida Bay during the fourth quarter of 2000 ranged from less than 0.1 to 39.3 ppt.

Salinities greater than 35 ppt were observed in Florida Bay during all three months of the fourth quarter of 2000 (**Figures 31a** through **31c**). Bay-wide salinities measured for the fourth quarter averaged 20.8, 21.5 and 24.0 ppt in October, November and December, respectively. The lower average salinity for October probably reflects rainfall and freshwater inflow to the bay associated with a poorly organized subtropical disturbance, which passed through south Florida in first week of the month.

Hypersaline conditions predominated in the central portion of Florida Bay. The number of stations in this portion of the bay with salinities greater than 35 ppt decreased throughout the fourth quarter. High rainfall during early October, as well as high freshwater inflows, contributed to the relatively low salinity levels observed in most of the bay, especially in the eastern portion.

Salinity levels measured over the last three years at monitoring sites in Highway Creek, Duck Key, Little Madeira Bay and Whipray Basin are presented in **Figure 32**. A summary of salinities recorded for the fourth quarter of 2000 at these monitoring sites is also presented in **Table 9**. No samples were collected at Highway Creek or Duck Creek during the November monitoring event. Salinities at (Duck Key and Whipray Basin) fluctuated by less than 1 ppt throughout the fourth quarter (**Figure 32**). A decrease in freshwater inflow to Highway Creek during December 2000 contributed to an increase in salinity at this site (**Table 9**). Salinity varied by approximately 4 ppt in Little Madeira Bay during the fourth quarter. In November, salinity decreased at this site to approximately 19 ppt. By December, salinity had rebounded to 22 ppt (**Figure 32**).

Table 9. Salinity (ppt) in Florida Bay

	Oct-00	Nov-00	Dec-00
Highway Creek	4.1	-ND-	6.9
Duck Key	26.8	-ND-	26.4
L. Madeira Bay	22.3	18.8	22.4
Whipray Basin	36.1	36.0	36.9

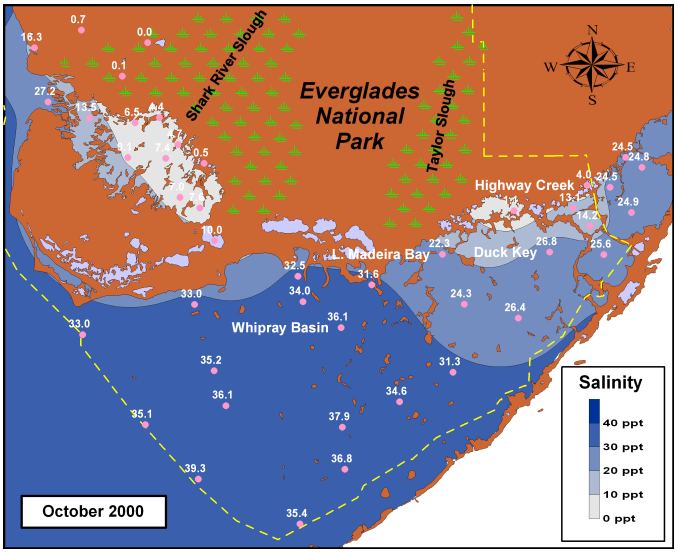

Figure 31a. Salinity in Florida Bay and the western coast of the Everglades National Park for October 2000 (Data collected by Florida International University.)

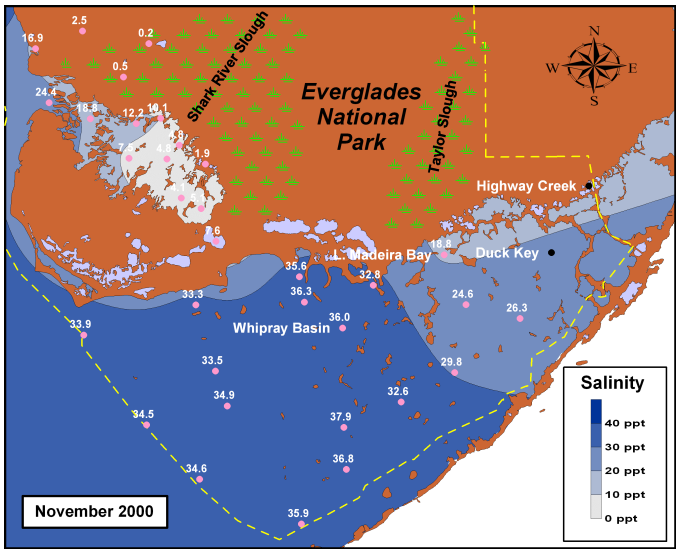

Figure 31b. Salinity in Florida Bay and the western coast of the Everglades National Park for November 2000 (Data collected by Florida International University.)

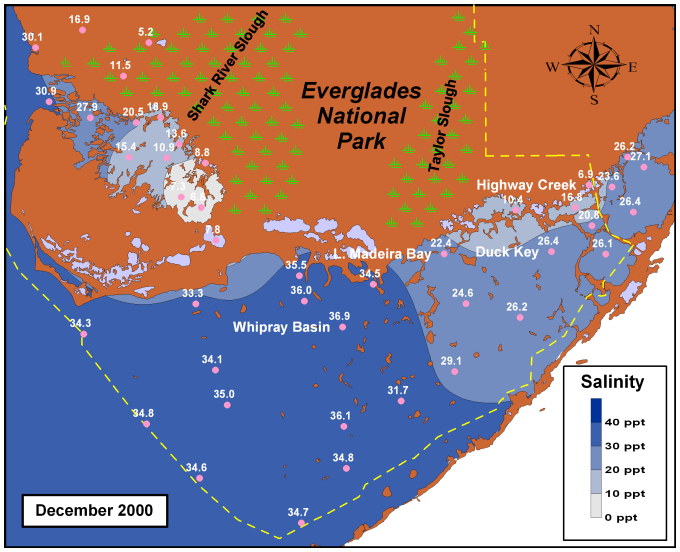

Figure 31c. Salinity in Florida Bay and the western coast of the Everglades National Park for December 2000 (Data collected by Florida International University.)

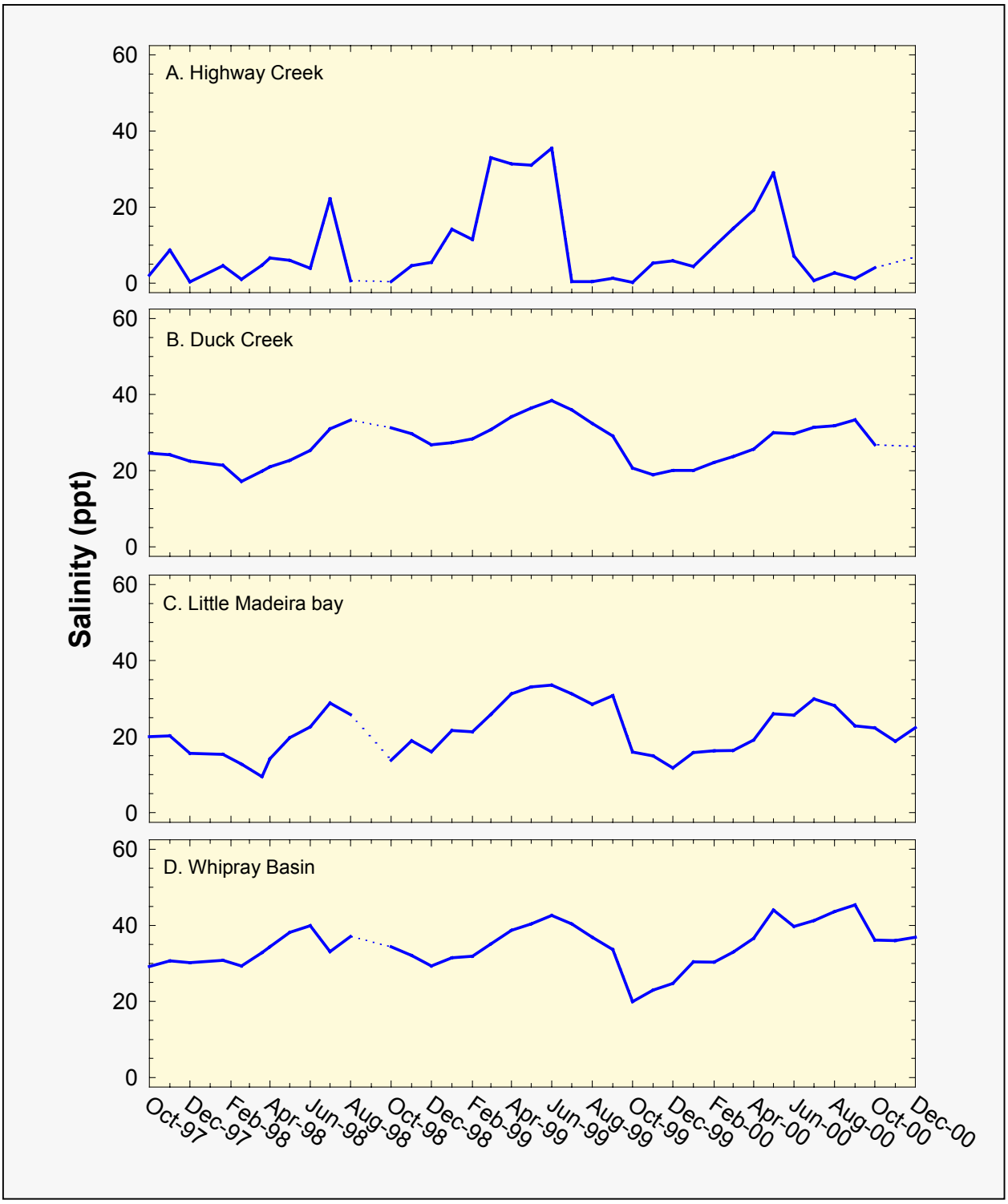

Figure 32. Salinity at four sites in Florida Bay from October 1997, through December 2000 (dashed lines indicate missing data).

Chlorophyll *a* Concentrations

Large areas of dense algal communities can affect the overall health of the Florida Bay ecosystem. Chlorophyll *a* concentrations measured in the bay are an indicator of algae (phytoplankton) biomass. Regional chlorophyll *a* concentrations in Florida Bay and the west coast of the Everglades National Park are collected monthly. The distributions of chlorophyll *a* levels measured in the bay during October, November and December are shown in **Figures 33a** through **33c.**

During the fourth quarter of 2000, chlorophyll *a* concentrations in Florida Bay averaged 1.0 parts per billion (ppb) and ranged from 0.1 to 6.0 ppb. Mean chlorophyll *a* concentrations in the bay increased from 0.8 ppb in October to 1.1 ppb in December 2000 (**Figure 33a** to **33c**). The eastern and southern portions of Florida Bay exhibited lower chlorophyll *a* levels. This trend has been reported in previous issues of this report. The highest chlorophyll *a* levels measured in Florida Bay during the fourth quarter were observed at Garfield Bight and Rankin Basin (both areas are located directly northwest of Whipray Basin)(**Figure 33c**). These higher chlorophyll *a* levels may be attributed to nutrient inputs to the bay from runoff as well as wind-induced, turbulent mixing resulting in the resuspension of sediments.

Chlorophyll *a* concentrations measured at four sampling stations in Florida Bay over the past three years of monitoring are shown in **Figure 34**. In addition, a summary of chlorophyll *a* concentrations measured during the fourth quarter of 2000 is provided in **Table 10**. In general, chlorophyll *a* levels measured at these sites during the fourth quarter of 2000 were lower than those measured for the same period the previous year.

During fourth quarter of 2000, Little Madeira Bay exhibited a decrease in chlorophyll *a* levels (**Table 10**). Meanwhile, chlorophyll *a* levels at Duck Key were relatively unchanged during this three-month monitoring period. Chlorophyll *a* levels at Highway Creek and Whipray Basin increased (**Table 10**).

During third quarter of 2000, Highway Creek exhibited a decrease in chlorophyll *a* levels (**Table 10**). Meanwhile, chlorophyll *a* levels at Duck Key and Little Madeira Bay were relatively unchanged during this three-month monitoring period. Chlorophyll *a* levels at Whipray Basin, however, increased from 0.8 to 1.2 ppb (**Table 10**).

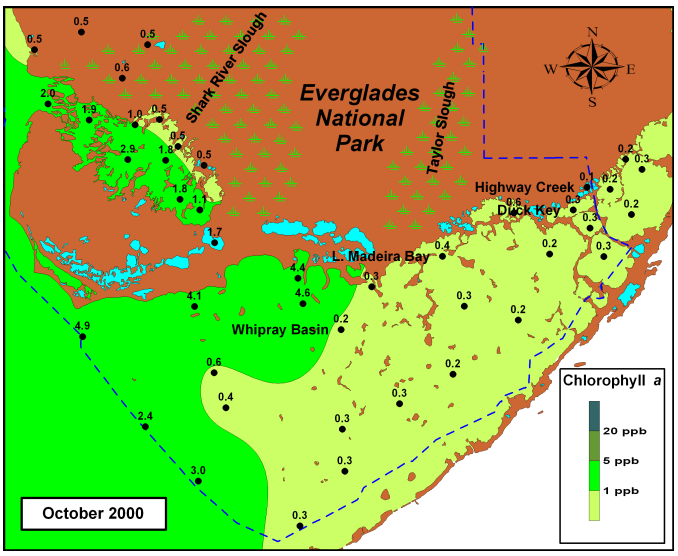

Figure 33a. Concentrations of chlorophyll *a* in Florida Bay and the western coast of Everglades National Park for October 2000. (Data collected by Florida International University.)

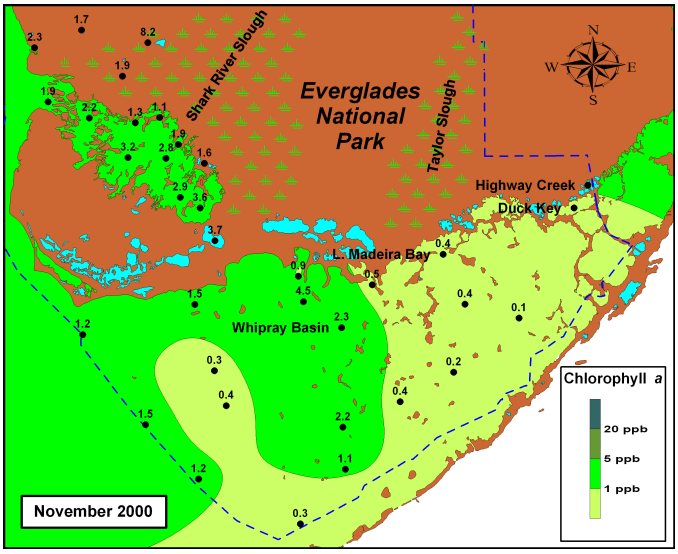

Figure 33b. Concentrations of chlorophyll *a* in Florida Bay and the western coast of Everglades National Park for November 2000. (Data collected by Florida International University.)

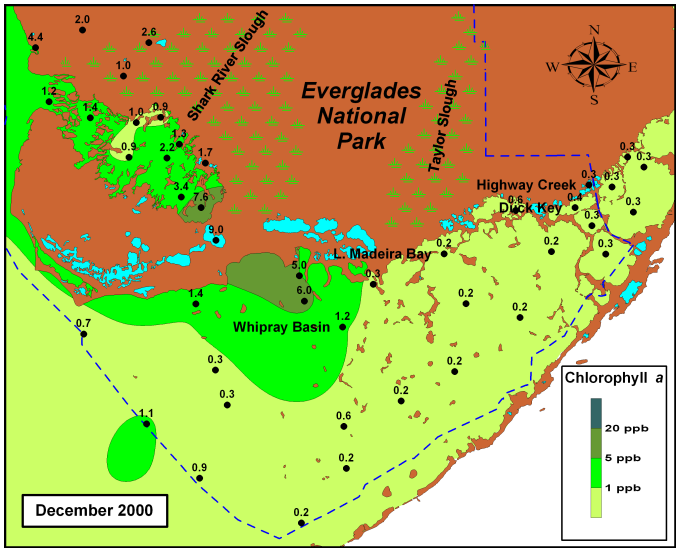

Figure 33c. Concentrations of chlorophyll *a* in Florida Bay and the western coast of Everglades National Park for December 2000. (Data collected by Florida International University.)

Table 10. Chlorophyll *a* (ppb) in Florida Bay

	Oct-00	Nov-00	Dec-00
Highway Creek	0.1	-ND-	0.4
Duck Key	0.2	-ND-	0.2
L. Madeira Bay	0.4	0.4	0.2
Whipray Basin	0.2	2.3	1.2

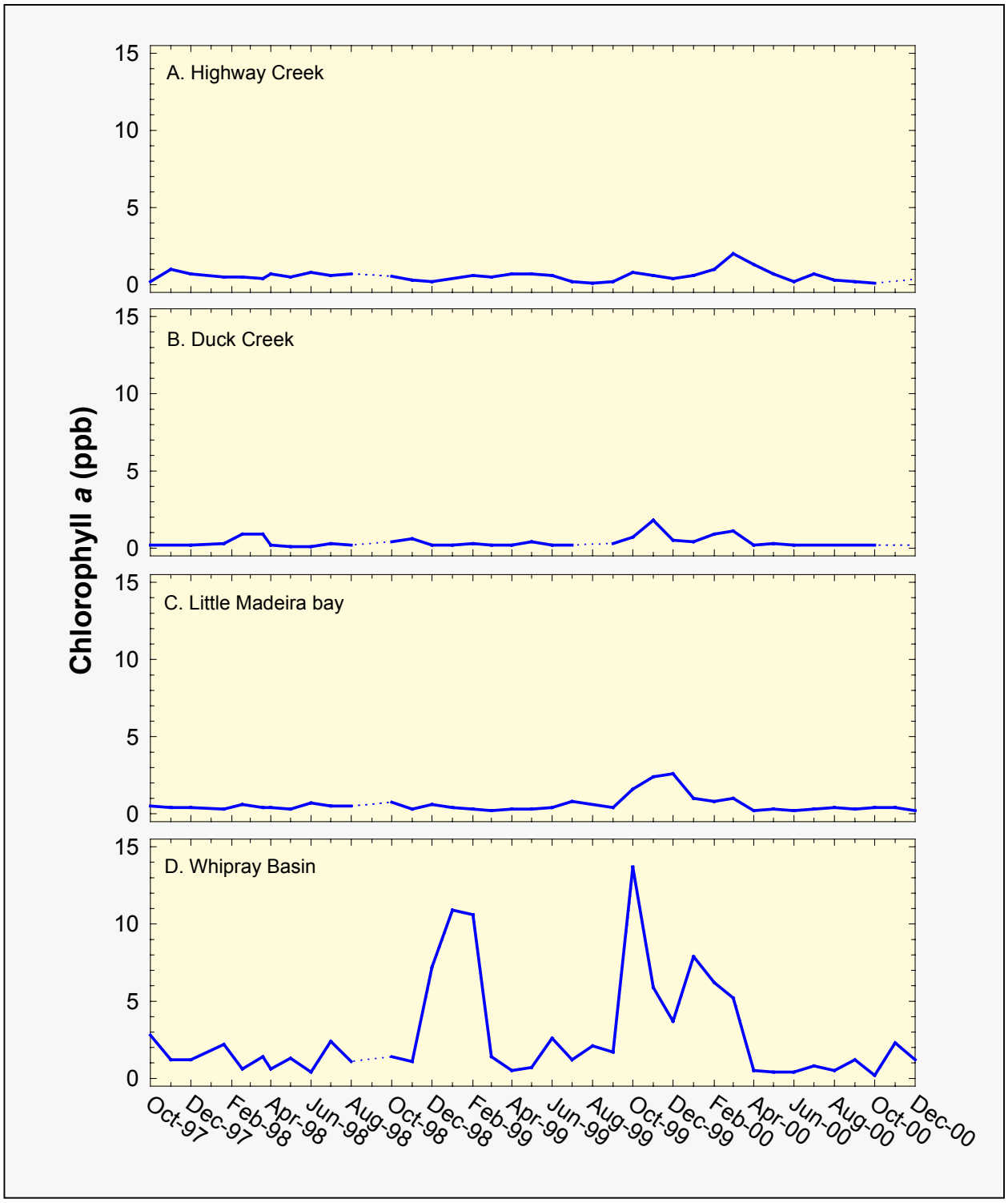

Figure 34. Chlorophyll *a* concentrations at four sites in Florida Bay from October 1997, through December 2000 (dashed lines indicate missing data).